

Chapter 4 Challenges

Chapter Summary

Lesson 4-1

- **Fossils** are the remains or traces of organisms that lived many years ago.
- Fossils form in sedimentary rock. Members of some extinct species have been preserved in frozen soil or ice.
- The bones of many animals trapped in tar pits were preserved.
- Some insects and plant parts have been perfectly preserved in **amber**.

Lesson 4-2

- Fossils show that many kinds of organisms lived at different times in Earth's history. They show that some living things have changed over millions of years. They also show that Earth's climate and surface have changed over million of years.

Lesson 4-3

- Scientists use the **law of superposition** to tell the **relative age** of a rock layer.
- **Index fossils** can be used to help find the relative age of rock layers in the same area or from two different parts of the world.

Lesson 4-4

- The specific age of a rock or a fossil is called its **absolute age**.
- Radioactive elements are like natural clocks. The **half-life** of radioactive elements can be used to find the absolute age of a rock or fossil.
- Carbon-14 is used to find the absolute age of the remains of living things.

Lesson 4-5

- Some scientists estimate that Earth is more than 4.6 billion years old.
- The **geologic time scale** is a record of the major divisions in Earth's history.
- The major divisions of geologic time are eras, periods, and epochs.

Lesson 4-6

- Petroleum, coal, and natural gas are **fossil fuels**.
- When hydrocarbons are burned, they give off energy as light and heat.

Key Term Challenges

absolute age (p. 98)	geologic time scale (p. 100)
amber (p. 90)	half-life (p. 98)
cast (p. 90)	index fossil (p. 96)
coprolite (p. 94)	law of superposition (p. 96)
fossil (p. 90)	mold (p. 90)
fossil fuel (p. 102)	relative age (p. 96)
gastrolith (p. 94)	

MATCHING Write the Key Term from above that best matches each description.

1. outline of the major divisions in Earth's history
2. imprint in a rock that has the shape of an extinct organism
3. age of an object compared to the age of another object
4. specific age of a rock or fossil
5. length of time it takes for one-half the amount of a radioactive element to change into another element

FILL IN Write the Key Term from above that best completes each statement.

6. Oil, coal, and natural gas are three kinds of _____.
7. A mold that has been filled with sediments forms a _____.
8. The bodies of entire insects have been found preserved in hardened tree sap called _____.
9. The traces or remains of living things that lived long ago are called _____.
10. A trilobite can be used as an _____.
11. A _____ was a stone some ancient animals swallowed to help grind up their food.
12. Scientists use the _____ to tell the relative age of rocks and fossils.

Content Challenges **TEST PREP**

MULTIPLE CHOICE Write the letter of the term or phrase that best completes each statement.

1. A species that once lived on Earth but is no longer found alive is called
 - a. a fossil.
 - b. an imprint.
 - c. a cast.
 - d. extinct.
2. Most fossils are found in
 - a. metamorphic rock.
 - b. sedimentary rock.
 - c. mud.
 - d. igneous rock.
3. Footprints are a kind of fossil called
 - a. a mold.
 - b. a cast.
 - c. an imprint.
 - d. amber.
4. The bodies of woolly mammoths and woolly rhinoceroses have been found preserved in
 - a. amber.
 - b. sedimentary rocks.
 - c. ice.
 - d. petrified forests.
5. Three ways in which the entire bodies of organisms are preserved are
 - a. ice, tar, and amber.
 - b. ice, molds, and casts.
 - c. tar, molds, and casts.
 - d. molds, petrified wood, and amber.
6. Graptolites and trilobites are two kinds of
 - a. radioactive elements.
 - b. molds.
 - c. casts.
 - d. index fossils.
7. Peat is the first stage in the formation of
 - a. natural gas.
 - b. tar.
 - c. coal.
 - d. petroleum.
8. The law of superposition states that each undisturbed rock layer is older than the one
 - a. beside it.
 - b. above it.
 - c. below it.
 - d. to its left.
9. Fossils show how Earth's climate and topography have
 - a. changed over time.
 - b. stayed about the same over time.
 - c. improved over time.
 - d. worsened over time.

TRUE/FALSE Write *true* if the statement is true. If the statement is false, change the underlined term to make the statement true.

10. Shells and nails are often the only parts of organisms that are preserved.
11. Elephant-like animals called saber-toothed cats have been discovered preserved in ice.
12. The LaBrea tar pits are located in southern California.
13. The bodies of entire insects have been found preserved in amber.
14. When fossil fuels are burned, they give off energy in the forms of heat and electricity.
15. Fossil fuels are formed when bacteria, heat, and pressure act on decaying plants and animals.
16. Fossils of alligator-like animals found in Canada indicate that the climate of Canada was always cold.




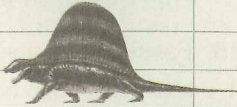
Concept Challenges **TEST PREP**

WRITTEN RESPONSE Answer each of the following questions in complete sentences.

- INFER:** Suppose you find fossils of clams in rock high on a mountain. What can you infer about the mountain?
- DESCRIBE:** How is U-238 used for the specific dating of rocks?
- DESCRIBE:** What is the geologic time scale? Give examples in your explanation.
- EXPLAIN:** Why is carbon-14 not useful for dating rocks that are more than 50,000 years old?
- ANALYZE:** What method would you use to date a sedimentary rock that you think is about 1 million years old? Why?

INTERPRETING VISUALS Use Figure 4-23 to answer the following questions.

- What is the name of the most recent era in geologic time?
- How long ago did dinosaurs roam Earth's surface?
- During which period did conifers such as pine trees first appear?
- During which period did snakes first appear?
- Which era lasted the longest?

GEOLOGIC TIME SCALE				
Era	Period	Epoch	Approximate Start Date (millions of years ago)	Organisms First Appeared
	Quaternary	Recent	0.025	Modern humans
		Pleistocene	1.75	Mammoths
	Tertiary	Pliocene	14	Large carnivores
		Miocene	26	Many land mammals
		Oligocene	40	Primitive apes
		Eocene	55	Early horses
		Paleocene	65	Primates
Mesozoic	Cretaceous		130	Flowering plants
	Jurassic		180	Dinosaurs
	Triassic		225	Conifers
	Permian		275	Seed plants
	Carboniferous		345	Reptiles
	Devonian		405	Insects, amphibians
	Silurian		435	Fishes
	Ordovician		480	Algae, fungi
	Cambrian		600	Invertebrates
Precambrian			4600	Bacteria, blue-green bacteria

▲ Figure 4-23